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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
SINKANTARAKORN, PAWARIS

ART UNIT	PAPER NUMBER
2464	

NOTIFICATION DATE	DELIVERY MODE
04/15/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@slwip.com
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Office Action Summary	Application No.	Applicant(s)	
	10/749,902	MALTSEV ET AL.	
	Examiner	Art Unit	
	Pao Sinkantarakorn	2464	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 February 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24,26 and 27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *2,5,7,12,13,18-21,26 and 27* is/are allowed.

6)☒ Claim(s) *1,3,4,6,8-11,14-17,22, and 23* is/are rejected.

7)☒ Claim(s) *24* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/24/2010 has been entered.

2. Claims 1-24 and 26-27 are currently pending in the application.

Claim Rejections - 35 USC § 103

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 3, 4, 6, 8-11, and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tu et al. (US 2005/0144650) and Shah (USPN 6,173,164), in view of Nedic et al. (US 2003/0063680).

Regarding claim 1, Tu et al. disclose a receiver comprising:

a plurality of subchannel low-pass filters, each associated with one of a plurality of subchannels (see Figure 4A, LPFs 438 and paragraph 48, each LPF and HPF pair associated with a single sub-channel);

a subchannel filter selection switch to provide an analog signal to a selected one of the plurality subchannel low-pass filters (see Figure 4A and paragraph 44, mixers provide IF1 signal to a selected LPF 438-1A); and

a heterodyne frequency generator to provide one of a plurality of heterodyne frequencies to convert a radio-frequency signal received within a selected subchannel to the analog signal (see Figure 4A and paragraph 44, mixers for downconverting a first channel to a first, relatively lower, intermediate frequency),

wherein the subchannel low-pass filters are to accumulate signal information from an associated one of a plurality of subchannels during a filter-input sampling interval (see paragraph 48, variable LPFs remove the upper side band transponders from the desired channel centered at IF1, thus, the variable LPFs accumulate the lower side band transponders from the desired channel centered at IF1).

Tu et al. do not expressly disclose a heterodyne frequency generator to convert a radio-frequency signal to a baseband signal. Shah, from the same or similar fields of endeavor, disclose the heterodyne frequency generator to convert a radio-frequency signal to a baseband signal (see column 3 lines 23-39, the downconversion block shifts the frequency of the input signal to baseband).

Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to replace the heterodyne frequency generator of Tu et al. with the heterodyne frequency generator to convert a radio-frequency signal to a baseband signal of Shah because one of ordinary skill in the art would have been able to carry out such a simple substitution and the results were reasonably predictable.

Tu et al. and Shah do not expressly disclose a subchannel filter selection switch having a plurality of outputs, wherein each output is coupled to an input of one of the subchannel low-pass filters, the subchannel filter selection switch is to select a subchannel low-pass filter associated with one of the outputs.

However, Nedic et al., from the same or similar fields of endeavor, disclose a receiver portion (see Figure 1) similar to that of Tu et al., where the received signal r(t) is provided to a plurality of mixers (see Figure 1, demodulators), and then the signals

are provided to low pass filters g(t) (see Figure 1, Low Pass Filters), where each low pass filter is associated with a subchannel. Nedic et al. also disclose the same receiver portion in digital implementation (see Figure 2B), where the received signal r(n) is provided to the subchannel filter switch, where the switch having a plurality of outputs and each output is coupled to an input of one of the subchannel low pass filters (see Figure 2B, commutator 28), the switch selects a subchannel low-pass filter associated with one of the outputs in a clock-wise direction (see Figure 2B, commutator 28 and paragraph 39). Thus, it is implied that the receiver portion of Figure 1 of Nedic et al. also include a switch having a plurality of outputs, wherein each output is coupled to an input of one of the subchannel low-pass filters, the subchannel filter selection switch is to select a subchannel low-pass filter associated with one of the outputs.

Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to replace the switch of Tu et al. and Shah with the switch having a plurality of outputs, wherein each output is coupled to an input of one of the subchannel low-pass filters, the subchannel filter selection switch is to select a subchannel low-pass filter associated with one of the outputs of Nedic et al. because one of ordinary skill in the art would have been able to carry out such a simple substitution and the results were reasonably predictable.

Regarding claim 3, Tu et al. disclose the receiver is a wideband channel receiver further comprising radio-frequency circuitry to receive orthogonal frequency division multiplexed signals in a wideband channel (see Figure 4A and paragraphs 36-

38, combining multiple independent channels into a sub-channel corresponds to OFDM) comprising a plurality of subchannels,

wherein each subchannel filter corresponds to one of the plurality of subchannels (see Figure 4A and paragraph 48, LPF 438-1A corresponds to a subchannel),

wherein the subchannels have a subchannel bandwidth (see paragraph 48).

Tu et al. does not expressly teach the subchannel low-pass filters have a filter bandwidth of approximately half the subchannel bandwidth. However, Shah, from the same or similar fields of endeavor, discloses the subchannel low-pass filters have a filter bandwidth of approximately half the subchannel bandwidth (see Figure 3 and column 4 lines 46-59, f_{VCXO}±fc, where fc is approximately half of f_{VCXO}).

Thus, it would have been obvious to implement the subchannel low-pass filters have a filter bandwidth of approximately half the subchannel bandwidth as taught by Shah into the receiver of Korobkov et al. and the results were reasonably predictable.

Regarding claim 4, Tu et al. disclose the receiver further comprises:

a whole-channel analog-to-digital converter (see Figure 4A, A/D 442-1-2); and

a subchannel filter output selection switch responsive to a subchannel filter ouput selection signal to provide an accumulated signal output from the selected subchannel low-pass filter to the whole-channel analog-to-digital converter (see Figure 4A, Summer 437-1-2 provides signal output from the LPF to A/D 442-1-2);

regarding claim 6, a plurality of subchannel analog-to-digital converters (see Figure 4A A/D 442-1-2), the subchannel analog-to-digital converters to receive an

accumulated signal output from a corresponding one of the subchannel low-pass filters (see Figure 4A, the A/D converters receive signals from the Low-Pass Filters 438);

regarding claim 8, further comprising an attenuator in a radio-frequency signal path responsive to the subchannel selection signal to attenuate the radio-frequency signal and provide a normalized signal level for the selected subchannel filter and a corresponding one of the subchannel analog-to-digital converters (see Figure 4A, BPF WB 422 and paragraph 40, the amplitude response is at least 40 dB attenuated);

regarding claim 9, the heterodyne frequency generator (see Figure 4A Frequency Synthesizer) comprises: a fixed-frequency voltage-controlled oscillator to generate a reference frequency (see paragraph 41, crystal oscillator XO); a digital synthesizer to generate a selected one of a plurality of stepped frequencies in response to a subchannel selection signal (see paragraph 41, a phase locked loop synthesizer); and a frequency combiner to combine the reference frequency and the selected one of the stepped frequencies to generate one of the plurality of heterodyne frequencies (see paragraph 41, the output local oscillator frequency is phase locked to the input reference frequency and its frequency is scaled by a factor M/N to the input reference signal frequency);

regarding claim 10, the heterodyne frequency generator (see Figure 4A Frequency Synthesizer) comprises: a plurality of fixed-frequency voltage-controlled oscillators, each fixed-frequency voltage-controlled oscillator to generate a corresponding one of the plurality of heterodyne frequencies (see paragraph 41, a phase locked loop synthesizer for each frequency synthesizer); and a subchannel

heterodyne switch to select a heterodyne frequency from one of the fixed-frequency voltage-controlled oscillators in response to a subchannel selection signal (see paragraphs 41 and 44);

regarding claim 11, the receiver comprising: a plurality of subchannel analog-to-digital converters, the subchannel analog-to-digital converters to receive an accumulated signal output from a corresponding one of the subchannel low-pass filters (see Figure 4A A/D 442-1-2 receives an accumulated signal from LPF 438); and a plurality of subchannel amplifiers to amplify the accumulated signal outputs based on a gain control signal, the gain control signal being generated for each subchannel (see Figure 4A AMP 436-1-2, AGC1,1 and paragraphs 53 and 55);

regarding claim 14, the subchannels comprise a plurality of symbol-modulated orthogonal subcarriers, and wherein each orthogonal subcarrier of a corresponding subchannel has a null at substantially a center frequency of other subcarriers of the corresponding subchannel (see paragraphs 35, 45, and 52);

regarding claim 15, prior to reception by the receiver, the subcarriers are to be individually modulated in accordance with an individual subcarrier modulation assignment comprising one of no modulation, BPSK, QPSK, 8PSK, 16-QAM, 32-QAM, 64-QAM, 128-QAM, and 256-QAM (see paragraph 51, QPSK).

7. Claims 16-17 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tu et al. and Shah, in view of Schaefer et al. (USPN 7,293,101), and further in view of Nedic et al.

Regarding claim 16, Tu et al. disclose a method comprising:

providing an analog signal to a selected one of a plurality of subchannel low-pass filters during the filter-input sampling interval (see Figure 4A and paragraph 44, mixers provide IF1 signal to a selected LPF 438-1A);

accumulating signal information from a selected one of a plurality of subchannels during a filter-input sampling interval in an associated subchannel low-pass filter (see paragraph 48, variable LPFs remove the upper side band transponders from the desired channel centered at IF1, thus, the variable LPFs accumulate the lower side band transponders from the desired channel centered at IF1); and

repeating the accumulating for others of the subchannels during the filter-input sampling interval (see paragraph 48, there are a plurality of the variable LPFs, thus, repeating the accumulating for the other variable LPFs of the other subchannels).

Tu et al. do not expressly disclose a heterodyne frequency generator to convert a radio-frequency signal to a baseband signal. Shah, from the same or similar fields of endeavor, disclose the heterodyne frequency generator to convert a radio-frequency signal to a baseband signal (see column 3 lines 23-39, the downconversion block shifts the frequency of the input signal to baseband).

Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to replace the heterodyne frequency generator of Tu et al. with the heterodyne frequency generator to convert a radio-frequency signal to a baseband signal of Shah because one of ordinary skill in the art would have been able to carry out such a simple substitution and the results were reasonably predictable.

Tu et al. and Shah et al. do not expressly disclose performing a fast Fourier transform on digital signals generated from the accumulated signal information from the plurality of subchannels to generate a received orthogonal frequency division multiplexed symbol.

Schaefer et al. disclose performing a fast Fourier transform on digital signals generated from the accumulated signal information from the plurality of subchannels to generate a received orthogonal frequency division multiplexed symbol (see Figure 12, Digital Processing 30 and column 7 lines 44-53, OFDM demodulation in a FFT unit).

Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to implement the digital processing 30 including the FFT unit of Schaefer et al. into the system of Tu et al. and Shah in order to retrieve appropriate OFDM symbols transmitted from the transmitter.

Tu et al. and Shah do not expressly disclose selecting with a subchannel filter selection switch one of a plurality of subchannel low-pass filters based on a selected subchannel of a plurality of subchannels.

However, Nedic et al., from the same or similar fields of endeavor, disclose a receiver portion (see Figure 1) similar to that of Tu et al., where the received signal r(t) is provided to a plurality of mixers (see Figure 1, demodulators), and then the signals are provided to low pass filters g(t) (see Figure 1, Low Pass Filters), where each low pass filter is associated with a subchannel. Nedic et al. also disclose the same receiver portion in digital implementation (see Figure 2B), where the received signal r(n) is provided to the subchannel filter switch, where the switch having a plurality of outputs

and each output is coupled to an input of one of the subchannel low pass filters (see Figure 2B, commutator 28), the switch selects a subchannel low-pass filter associated with one of the outputs in a clock-wise direction (see Figure 2B, commutator 28 and paragraph 39). Thus, it is implied that the receiver portion of Figure 1 of Nedic et al. also include a switch having a plurality of outputs, wherein each output is coupled to an input of one of the subchannel low-pass filters, the subchannel filter selection switch is to select a subchannel low-pass filter associated with one of the outputs.

Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to replace the switch of Tu et al. and Shah with the switch having a plurality of outputs, wherein each output is coupled to an input of one of the subchannel low-pass filters, the subchannel filter selection switch is to select a subchannel low-pass filter associated with one of the outputs of Nedic et al. because one of ordinary skill in the art would have been able to carry out such a simple substitution and the results were reasonably predictable.

Regarding claim 17, Tu et al. disclose providing, during the filter-input sampling interval, one of a plurality of heterodyne frequencies to convert a radio-frequency signal received within the selected subchannel to the baseband signal (see Figure 4A and paragraph 44, mixers for downconverting a first channel to a first, relatively lower, intermediate frequency);

regarding claim 22, the heterodyne frequency generator (see Figure 4A Frequency Synthesizer) comprises: a fixed-frequency voltage-controlled oscillator to generate a reference frequency (see paragraph 41, crystal oscillator XO); a digital

synthesizer to generate a selected one of a plurality of stepped frequencies in response to a subchannel selection signal (see paragraph 41, a phase locked loop synthesizer); and a frequency combiner to combine the reference frequency and the selected one of the stepped frequencies to generate one of the plurality of heterodyne frequencies (see paragraph 41, the output local oscillator frequency is phase locked to the input reference frequency and its frequency is scaled by a factor M/N to the input reference signal frequency);

regarding claim 23, the receiver comprising: a plurality of subchannel analog-to-digital converters, the subchannel analog-to-digital converters to receive an accumulated signal output from a corresponding one of the subchannel low-pass filters (see Figure 4A A/D 442-1-2 receives an accumulated signal from LPF 438); and a plurality of subchannel amplifiers to amplify the accumulated signal outputs based on a gain control signal, the gain control signal being generated for each subchannel (see Figure 4A AMP 436-1-2, AGC1,1 and paragraphs 53 and 55);

Allowable Subject Matter

8. Claims 2, 12-13, 18-21, and 26-27 are allowed.

9. Claim 16 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

10. Claims 17-24 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

11. Claims 5 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

12. **Examiner's Note**: Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

If the Applicant is of the opinion that an interview would help advance prosecution in this case, they are welcome to call the Examiner, Pao Sinkantarakorn, at the number listed below to schedule an interview. The Examiner prefers interview requests be accompanied with a detailed agenda via fax. The Examiner's fax number is (571) 270-2424. The Examiner is willing to consider proposed amendments, clarify

rejections, and discuss any other issues that are presented by the applicant or applicant's representative. Please note that the Examiner may not be able to accommodate all requests due to scheduling constraints. It is recommended that interview requests be sent with ample time to schedule an interview.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pao Sinkantarakorn whose telephone number is (571) 270-1424. The examiner can normally be reached on Monday-Thursday 9:00am-3:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on (571) 272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/P. S./
Examiner, Art Unit 2464
4/8/2010

/Ricky Ngo/
Supervisory Patent Examiner, Art Unit 2464